

ELEMENT 7

The process for assuring adequate controls over the disposition of all residual waste from any water treatment processing

***Summary** – Assuring adequate controls over the disposition of all residual waste or sludge from any water treatment processing is authorized under state authority by adding sludge requirements to the state Water Pollution Control Operating Permit. Specific issues involving sludge (residuals) for the Missouri and Mississippi rivers involving permitting and other issues are addressed in the department’s regulations for effluent limits. Sludge is the byproduct of the industrial treatment process of raw wastewater and is the result of contaminants removed from the wastewater stream. Sludge that meets the requirements for land application is called biosolids. The Missouri Department of Natural Resources (the department) requires state operating permits for all persons who operate, use or maintain facilities for the storage, treatment or disposal of sludge and/or biosolids as well as construction permits for those who build such facilities for storage, treatment or disposal. The department, under state rules, administers a state biosolids program. A Missouri biosolids program has been in place since 1982, well before the first federal rules were issued in 1993. The U.S. Environmental Protection Agency (EPA) administers a separate national biosolids program. Missouri is not delegated to administer this program. The current Missouri biosolids program operates under the state permit rules and the delegated National Pollutant Discharge Elimination System (NPDES) permit program for wastewater treatment facilities. Missouri has incorporated, by reference, the NPDES Part 503 standards for sludge. Sludge facilities must meet the applicable control technology for sewage sludge treatment, use and disposal as published by the EPA and applicable state standards and limitations in the Missouri Clean Water Law. The Missouri Department of Natural Resources and the University of Missouri Cooperative Extension Services have developed guidance documents for permittees designed to promote safe use and disposal of biosolids.*

Sludge Management

Sludge is residual waste or the byproduct of wastewater treatment processing. Many organic solids, toxic organic chemicals and inorganic chemicals are removed from treated wastewater and concentrated in sludge or biosolids. Biosolids are defined in state rules as sludge that meets minimum pollutant level requirements for land applications. Biosolids, as applied to domestic sludge, must meet treatment process criteria for both pathogens and metal pollutant limitations for beneficial use. Most generate biosolids are considered a disposal problem. An estimated 250,000 dry tons of biosolids are generated in Missouri from wastewater treatment plants. Of this total, about 60 percent of the sludge is incinerated, 30 percent is applied onto agricultural land, 7 percent is deposited into holding lagoons and the remaining 3 percent is hauled to landfills. Land application of the sludge or biosolids is the preferred utilization method.

Biosolids

A state Biosolids program is administered by the Missouri Department of Natural Resources under state rules. Biosolids are sewage sludge suitable for land application, incineration or surface disposal. A separate National Biosolids program is administered by the EPA and has independent permitting and technical requirements under federal regulations. Missouri is delegated to administer National Pollutant Discharge Elimination System (NPDES) effluent permits but is *not* delegated for the NPDES Biosolids permitting program. NPDES sludge permitting regulations are authorized under 40 CFR Part 122, 501 and 503. Requirements for the states to assume delegation of the national program are authorized in 40 CFR Part 501. The Missouri biosolids program has been in place since 1982, well before the first federal 40 CFR Part 503 rules were issued in 1993.

Best management practices include nutrient management, soil conservation practices and other requirements that ensure biosolids are used properly when stored or disposed of. Sludge stored for more than two years is considered sludge disposal. The department provides technical assistance on best management practices and sludge processing systems to permittees.

Construction Permits

A state construction permit is required for all persons who build, erect, alter or replace facilities for sludge or biosolids storage, treatment or disposal. A permit fee based on the size of the facility is required for each construction application. Each construction permit application must include engineering plans, specifications and biosolids/sludge management plans. Plans must be developed according to state design regulations as published in the Missouri Code of State Regulations (CSR). The department reviews the application. A public notice of the proposed permit is then issued for a 30-day comment period. The sludge management system is built according to the approved design.

Operating Permits

Missouri enforces state sludge regulations under state authority by adding sludge requirements to the state Water Pollution Control Operating Permit. A state operating permit is required, unless exempted, for all persons who operate, use or maintain facilities for the storage, treatment or disposal of sludge and/or biosolids. Requirements for sludge are included in the wastewater permit. Sludge that is not used as biosolids must be disposed of in a permitted sludge disposal facility.

Industrial Sludge/Residuals

The definition for industrial waste sources under the Missouri Clean Water Law includes all facilities that are not domestic waste sources, namely, wastewater industrial facilities. Industrial facilities may land apply part or all of their waste materials according to waste characteristics, regulatory requirements, permittee desires and site-specific factors.

Industrial sludge is generated by industries not on a publicly owned treatment works system and by industries on a publicly operated system that require pretreatment of wastewater. Sludge is the byproduct of the industrial treatment process of raw wastewater and is the result of contaminants removed from the wastewater stream. The department issues state operating

permits to industrial facilities that produce sludge during wastewater treatment or generate residuals as a byproduct of manufacturing processes. These residues must be disposed of by land application, landfill and/or incineration. Industrial permits are written under state regulations that are at least as stringent or more stringent than the EPA's 40 CFR Part 503 regulations.

The generating industry is required to pre-treat industrial wastes to reduce pollutants to acceptable levels prior to discharge into a publicly operated treatment works system. Sludge removed by the industrial pretreatment process is the responsibility of the generating industry and has the same requirements as other industrial sludge. Industries may land apply part or all of their waste materials depending on waste characteristics, regulatory requirements, permittee desires and site-specific factors.

Additionally, industrial wastewater facilities that are discharging industrial wastewater into any state water body are issued permits by the department in compliance with state laws. Industrial facilities discharging into city sewers are permitted by the publicly owned treatment works and are required to pre-treat their raw wastewater according to federal regulations.

Publicly Operated Treatment Works System: Sludge Byproduct

A publicly-owned treatment works (POTWs) system not only receives wastewater from industrial facilities but also from commercial and residential sources. These POTWs are permitted by the city under federal general pretreatment regulations. Local control authorities have incorporated National Pollutant Discharge Elimination System (NPDES) limits into their permits with state approval.

Sludge and treated water are two products of POTWs. The department's regional offices write permits for wastewater treatment under the state's effluent regulations and NPDES requirements. These permits allow treated water to be discharged into state waters or irrigated onto crop land. State operating permits also address sludge under state regulations that are written to comply with Part 503 federal regulations. State operating permits are issued requiring compliance with Part 503 federal regulations as well as state effluent limits for domestic sludge land application.

In certain environmental settings, a higher level of wastewater treatment beyond EPA standards is required to protect especially sensitive water resources such as losing streams, areas with karst topography, recreational streams, wild and scenic rivers and other high quality or pristine areas. Land application as well as wastewater irrigation are the preferred options in these sensitive areas because both land application and irrigation provide beneficial treatment and reuse treated wastewater depending on the specific irrigation design.

Treatment System Design and Construction (Industrial and Domestic): Biosolids

Sludge meeting requirements for land application is called biosolids.

Department of Natural Resources Chapter 8 regulations contain the requirements for use and disposal of wastewater sludge. Biosolids useful to crop and soil requirements provide nutrients

and organic matter. They may also contain heavy metals and other substances that could affect soil productivity and quality of food. Before sludge is applied to crop, forest or pasture land the organic and bacterial contents are treated to levels deemed necessary to prevent nuisance odors and public health hazards. Other measures would be required if the processed biosolids are spread on dairy pastures or crops to be used for human consumption.

Operating permits include limitations and monitoring requirements, operation and reporting requirements, best management practices and other special conditions. Storm water monitoring and groundwater reports are submitted annually, quarterly or monthly depending on the size, complexity and location of the land application. Primary emphasis of the operating permit is to verify that the land application is being operated according to the approved plan and that water quality protection is maintained.

Permit application "Form R" for sludge/residuals, were first developed in 1998 to specifically address land application facilities. These forms supplement other existing permit application forms. The forms contain a detailed list of supporting documentation needed to address the regulatory requirements to characterize waste and soils and also include reference to other pertinent technical publications on toxicity and land application design parameters that must be addressed.

Domestic Sludge Land Application: Biosolids

Sewage sludge is a byproduct of domestic wastewater treatment. Many organic solids, toxic organic chemicals and inorganic chemicals are removed from wastewater and concentrated in sludge. Biosolids as defined in state regulations is sludge that has been treated and meets minimum pollutant levels for land application. Biosolids as applied to domestic sludge must meet treatment process criteria for both pathogens and metal pollutant limitations for beneficial use.

Prior to 1979, there were no specific state guidelines on sludge use and disposal. Since 1979 there have been state rules for sludge handling and disposal. Beginning in 1993 the state operating permit or National Pollutant Discharge Elimination System (NPDES) permit standard condition Part III and University of Missouri Water Quality Guide publications WQ420 and WQ449 have provided a planning framework for following state standards and guidelines for sludge disposal.

The current Missouri biosolids (sludge) management program operates under the state permit rules and the delegated NPDES permit program for wastewater treatment facilities. In 1994, Missouri incorporated by reference NPDES Part 503 standards for sludge. EPA administers the sludge program nationwide. The state addresses any Water Quality Standards violations while technical violations of federal permitting regulations are referred to EPA. Both NPDES sludge permit conditions and Part 503 requirements apply.

Discharges from wastewater treatment facilities that receive primarily domestic waste or from POTWs are required to undergo treatment. Sludge facilities must meet the applicable control technology for sewage sludge treatment, use and disposal as published by EPA Part 503 and applicable state standards and limitations published in the Missouri Clean Water Law and

regulations. Other applicable state laws involving use and disposal of sewage sludge include the Missouri Fertilizer Law, administered by the Director of the Missouri Agricultural Experiment Station in Columbia, Mo., and the Missouri Solid Waste Management Law, administered by the Missouri Department of Natural Resources.

The Missouri Department of Natural Resources and the University of Missouri Cooperative Extension Services developed guidance documents, designed to promote safe use and disposal of biosolids, for permittees. The standard conditions Part III in NPDES permits incorporate the University Extension water quality guidance documents by reference. The following water quality guides are issued with NPDES permits: WQ 422 Land Application of Septage, WQ 423 Monitoring Requirements for Biosolids Land Application, WQ Biosolids Standards for Pathogens and Vectors, WQ 425 Biosolids Standards for Metals and other Trace Substances and WQ 426 Best Management Practices for Biosolids Land Application.

The current Missouri biosolids management program operates under the state permit rules and the delegated NPDES permit program for wastewater treatment facilities. Missouri incorporated Part 503 standards by reference into our state regulation under Effluent Regulations, 10 CSR 20-7.015 (9) (F), which became effective May 9, 1994. However, the state is not delegated to run the federal sludge program, so EPA currently handles enforcement of Part 503 rules, and the state addresses water quality related violations.

References

- Missouri Clean Water Law, Chapter 644, RSMo., CSR Title 10, Division 20, Chapter 6, Permits, Chapter 7, Water Quality, Chapter 8, Design Guides and as follows; 2.010, Definitions, 6.010, Construction and Operating Permits, 6.011, Permit Fees, 6.015, No-Discharge Permits, 6.020, Public Participation, Hearings and Notice to Governmental Agencies, 6.200, Storm Water Regulation, 6.300, CAFO, 7.015, Effluent Regulations, 7.031, Water Quality Standards, 8.020, Design of Small Sewage Works, 8.110, Engineering Reports, Specifications, 8.220, Land Treatment, 8.500.
- Secondary Containment for Agrichemical Facilities, *Agricultural Waste Management Field Handbook*, National Engineering Handbook, Part 651, USDA.
- Natural Resources Conservation Services (NRCS), *Soil Test Interpretations and Recommendations Handbook*, University of Missouri, Department of Agronomy, December 1992.
- *Land Treatment of Municipal Wastewater*, U.S. EPA Document #625/1-81-013, Oct. 1991.
- *Land Treatment of Municipal Wastewater: Supplement on Rapid Infiltration and Overland Flow*, EPA Document #625/1-81-013a, Oct. 1994.
- *Design of Land Treatment Systems for Industrial Wastes*, (Not on POTW), Michael Ray Overcash, North Carolina State, 1979.
- *Industrial Wastewater/Sludge Land Application Training Workshop, Conference Proceedings*, University of Missouri Extension, May 1997.
- *Operation and Maintenance Consideration for Land Treatment Systems*, EPA #600/2-82-039, Jan. 1982.
- *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls*, EPA #841-B-96-004, September 1997.
- *Climatic Atlas for Design of Land Application Systems*, WP-1400, October 1984.

- The department's *Biosolids Management Handbook For Small Publicly Owned Treatment Works (POTWs)*, September 1995.
- EPA Region 7, *Land Application of Sludge and Domestic Septage, Process Design Manual*, U.S. EPA Document #625/R-95/001, September 1995.
- *Control of Pathogens and Vector Attraction in Sewage Sludge*, EPA Document # 625/R-92/013, Revised October 1999, <http://www.epa.gov/ORD/NRMRL>.
- *Geography of Soil Geochemistry of Missouri Agricultural Soils*, Geochemical Survey of Missouri, USGS Professional Paper 954-H,I, 1984.
- *Groundwater And Wellhead Protection Handbook*, EPA Document #625/R-94/001, September, 1994.
- *Transport and Fate of Contaminants In The Subsurface*, EPA Document #625/4-89/019, September 1989.
- *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls*, EPA Document #841/B-96/004, September 1997.